

For : SYSTEMS AND METHODS FOR
DYNAMIC DETECTION AND PREVENTION OF
ELECTRONIC FRAUD AND NETWORK
INTRUSION

1/35

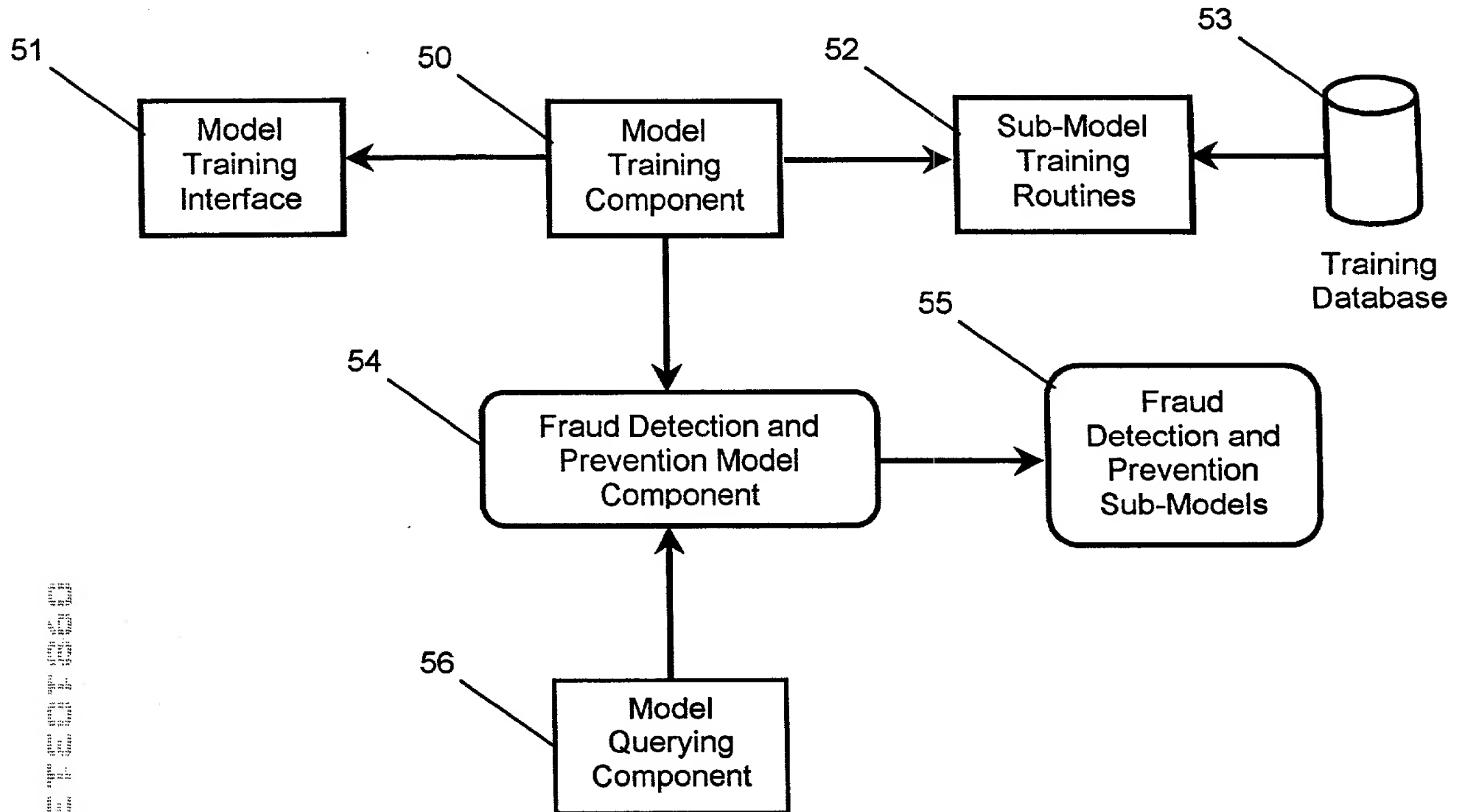
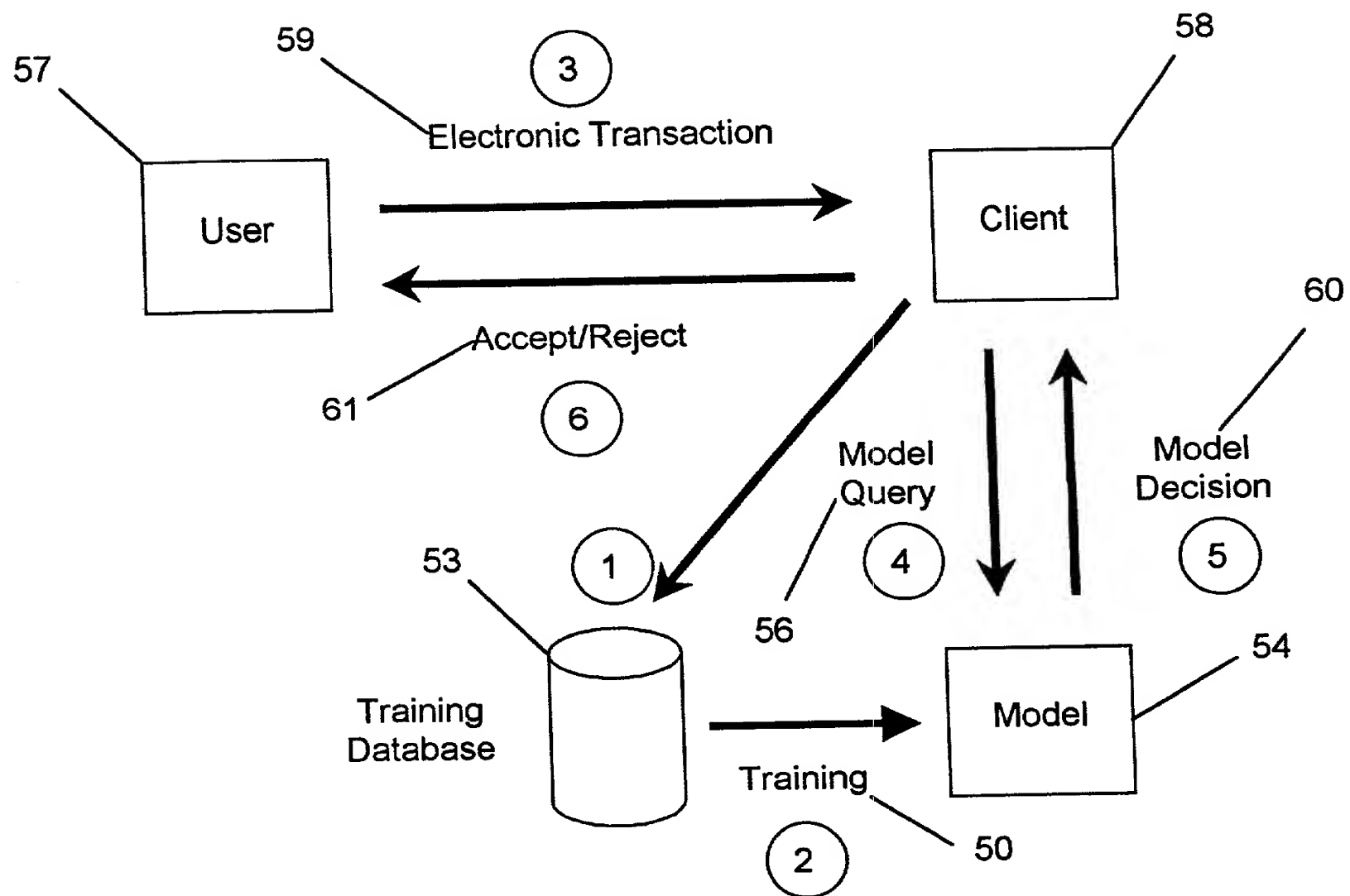


FIG. 1

**FIG. 2**

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ELECTRONIC FRAUD AND NETWORK
INTRUSION

3/35

62

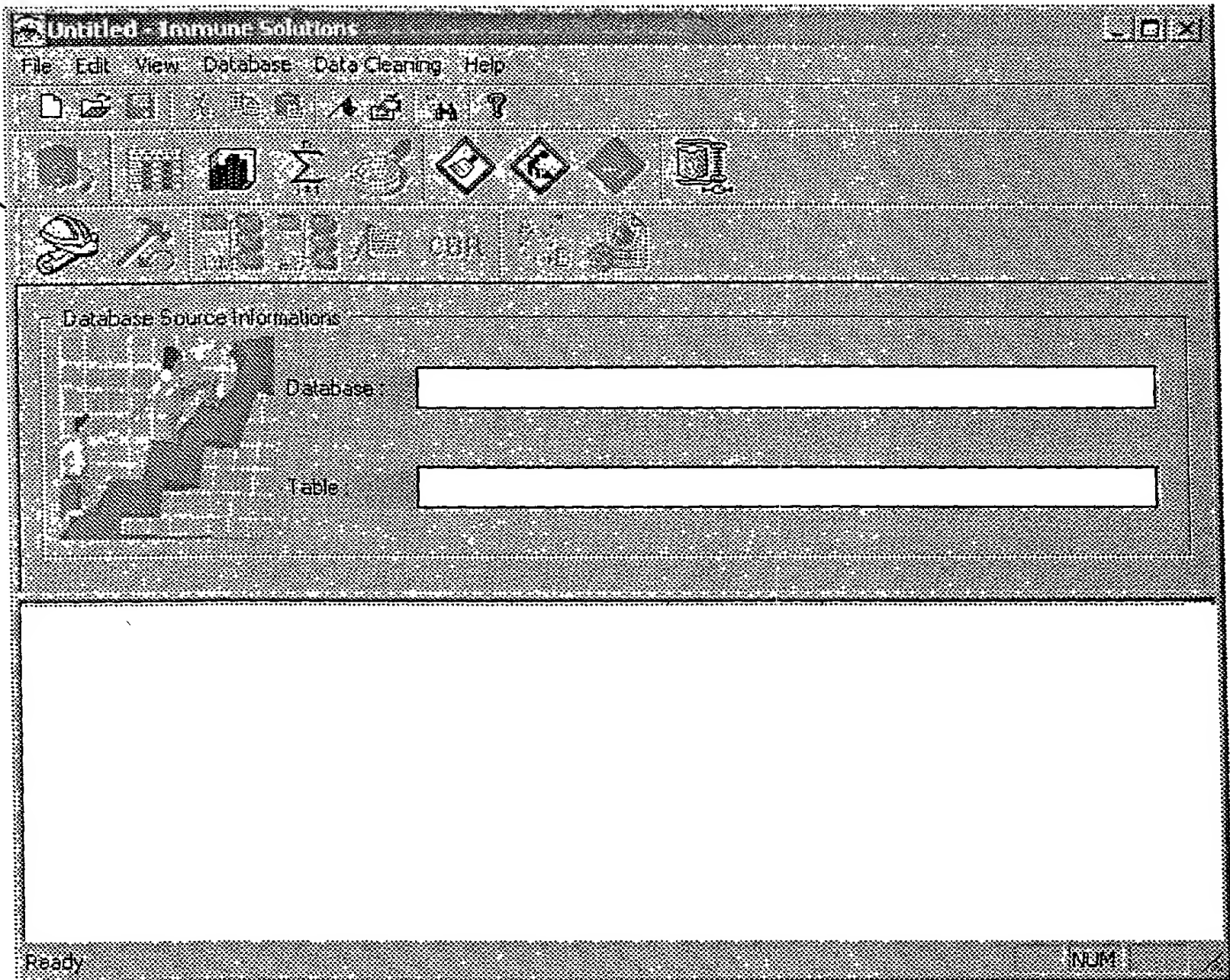


FIG. 3

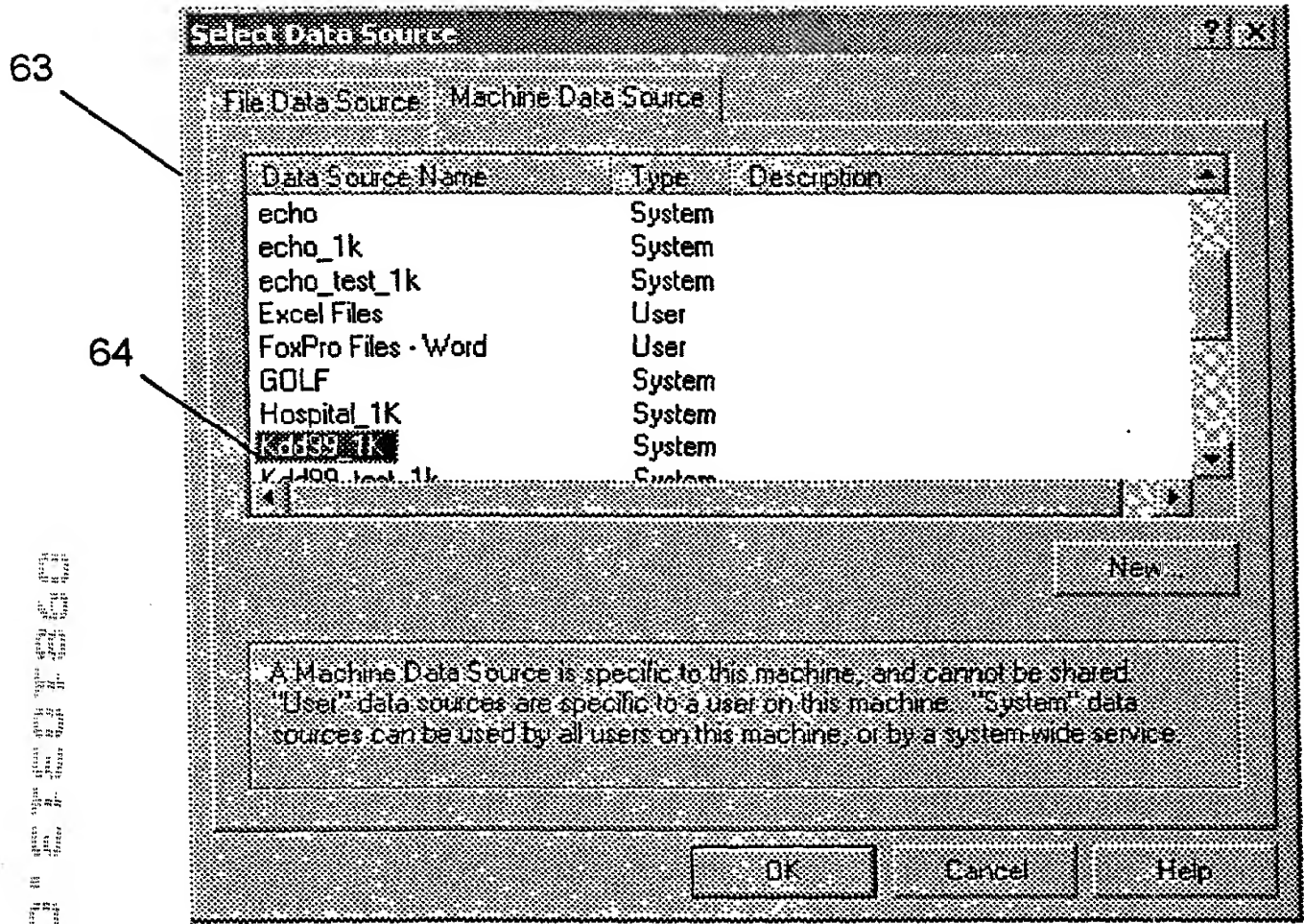


FIG. 4

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ELECTRONIC FRAUD AND NETWORK
INTRUSION

5/35

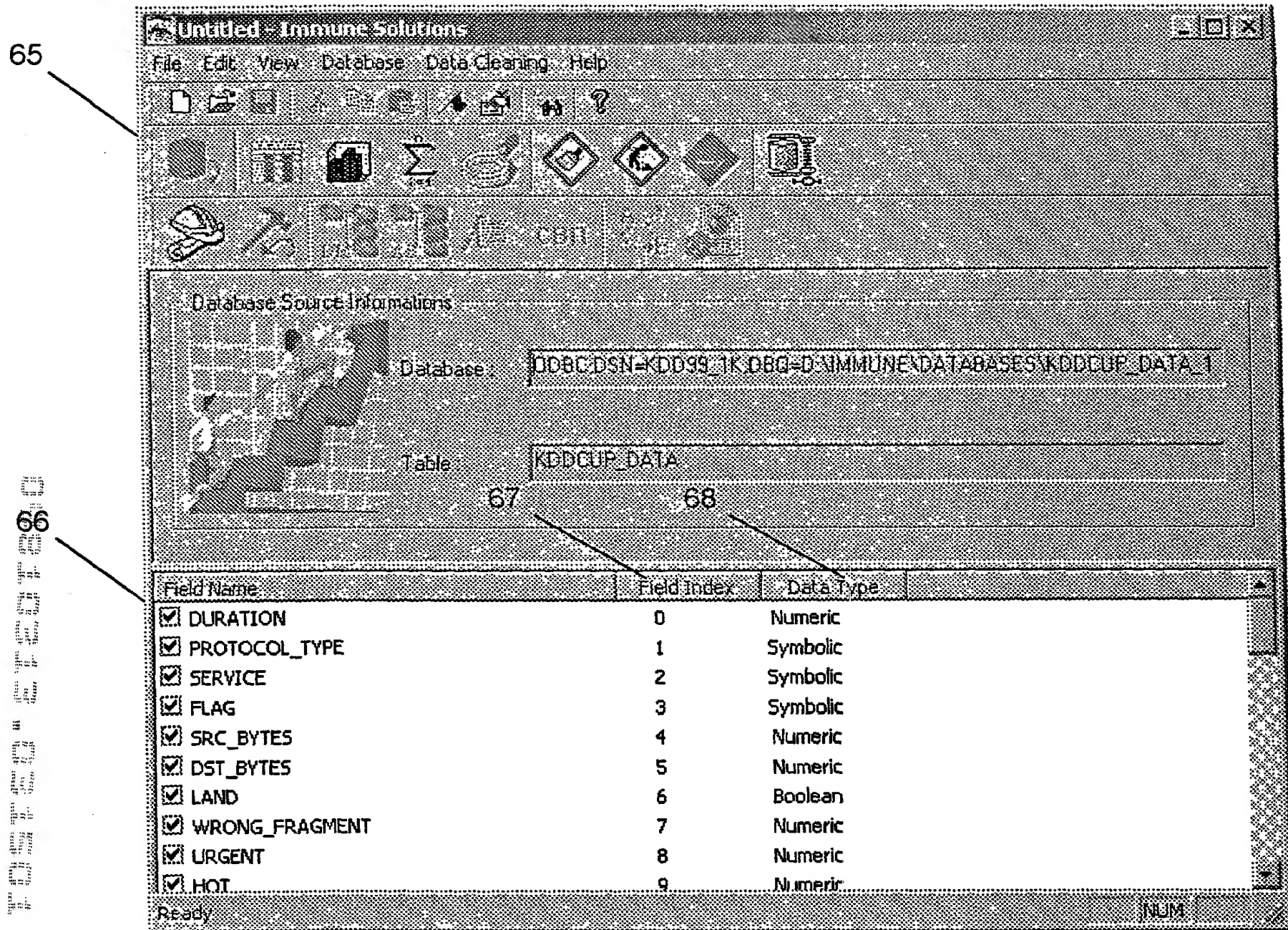


FIG. 5

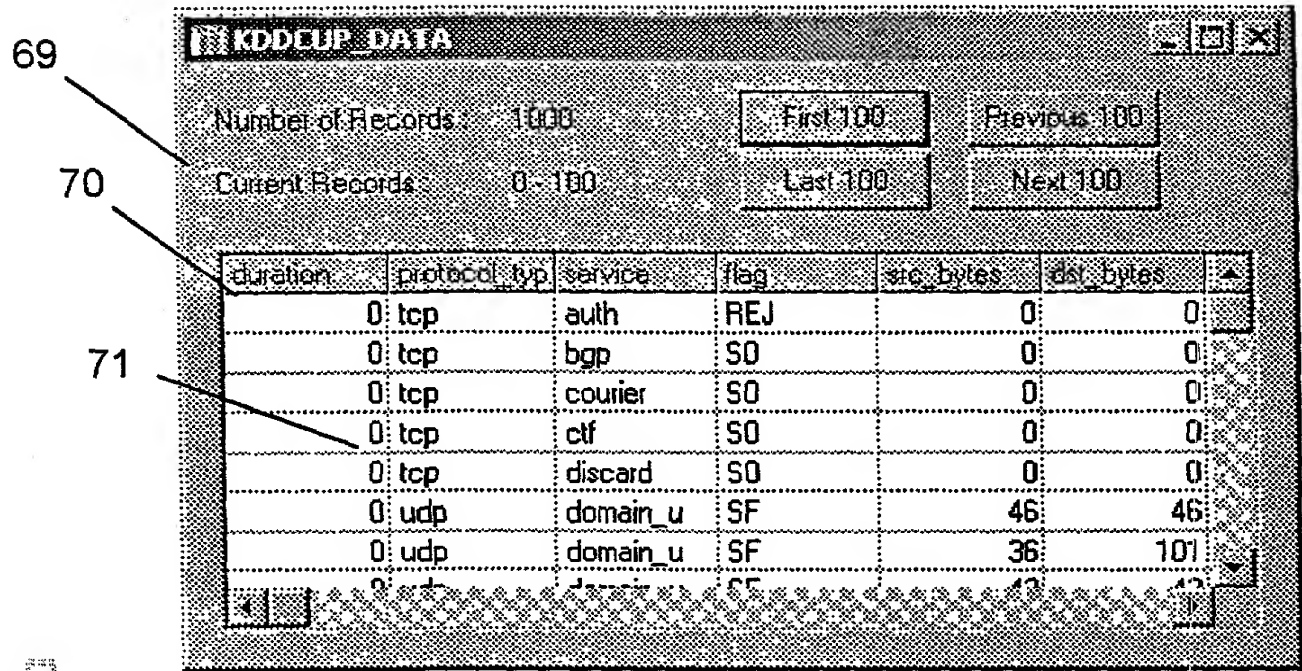


FIG. 6

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ELECTRONIC FRAUD AND NETWORK
INTRUSION

7/35

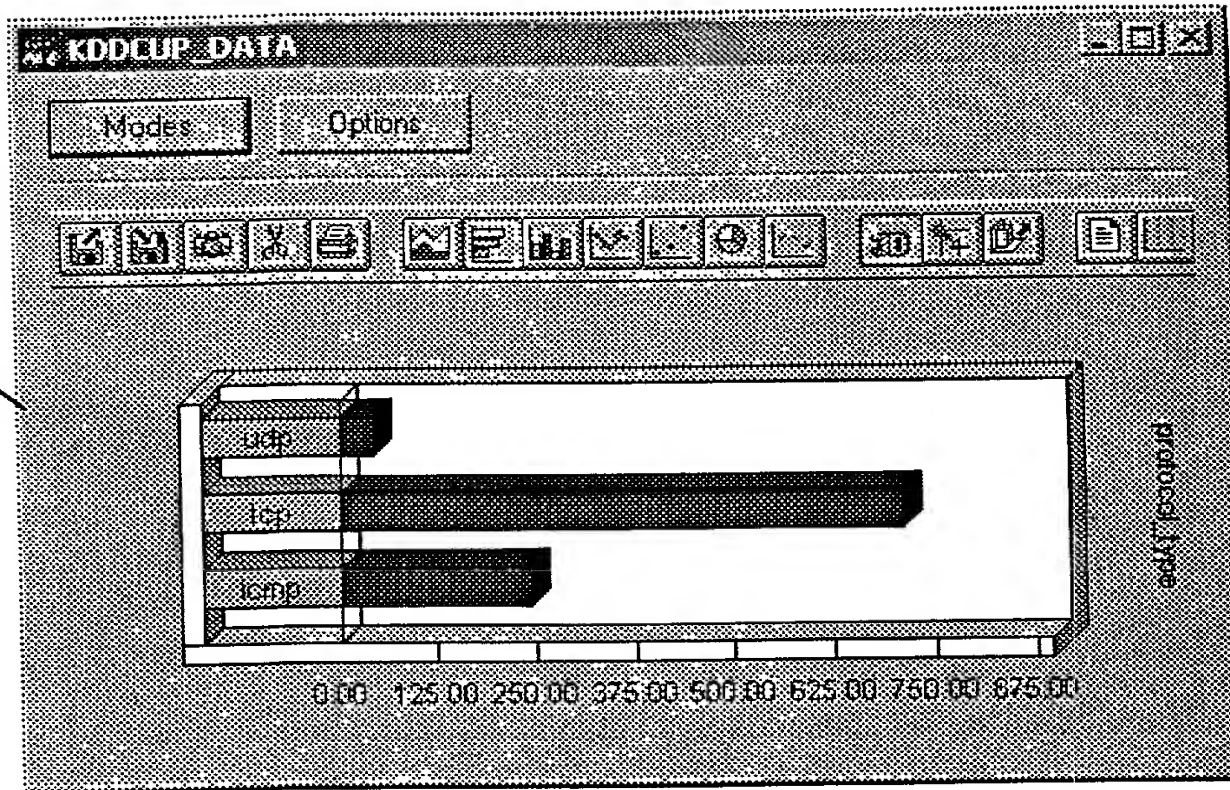


FIG. 7A

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DYNAMIC DETECTION AND PREVENTION OF
ELECTRONIC FRAUD AND NETWORK
INTRUSION

8/35

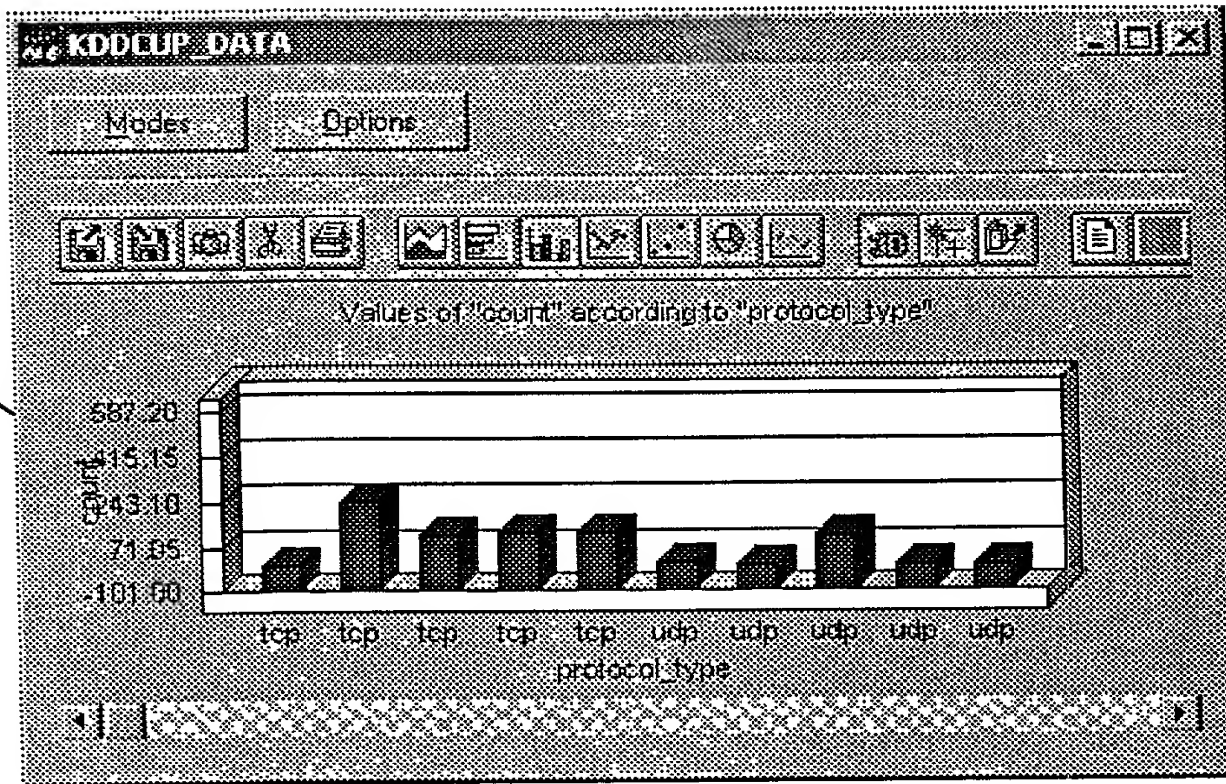


FIG. 7B

74

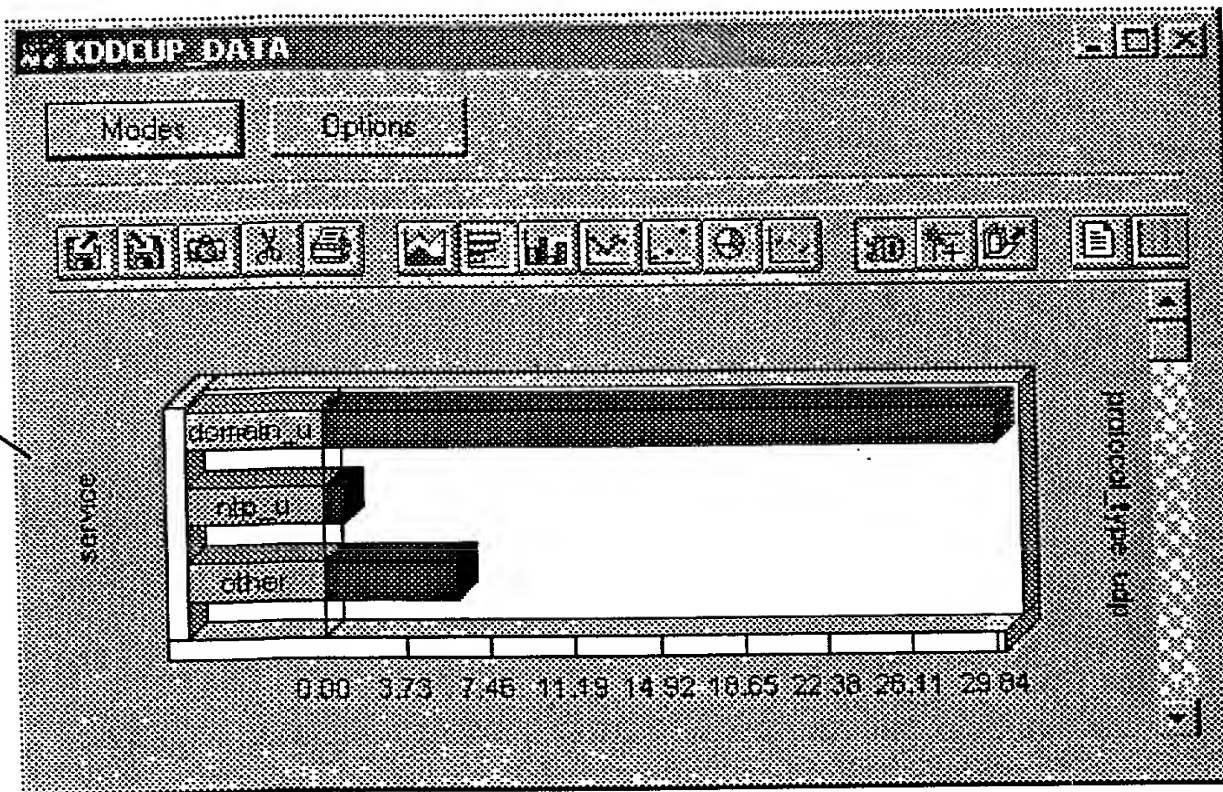


FIG. 7C

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ELECTRONIC FRAUD AND NETWORK
INTRUSION

10/35

75

76

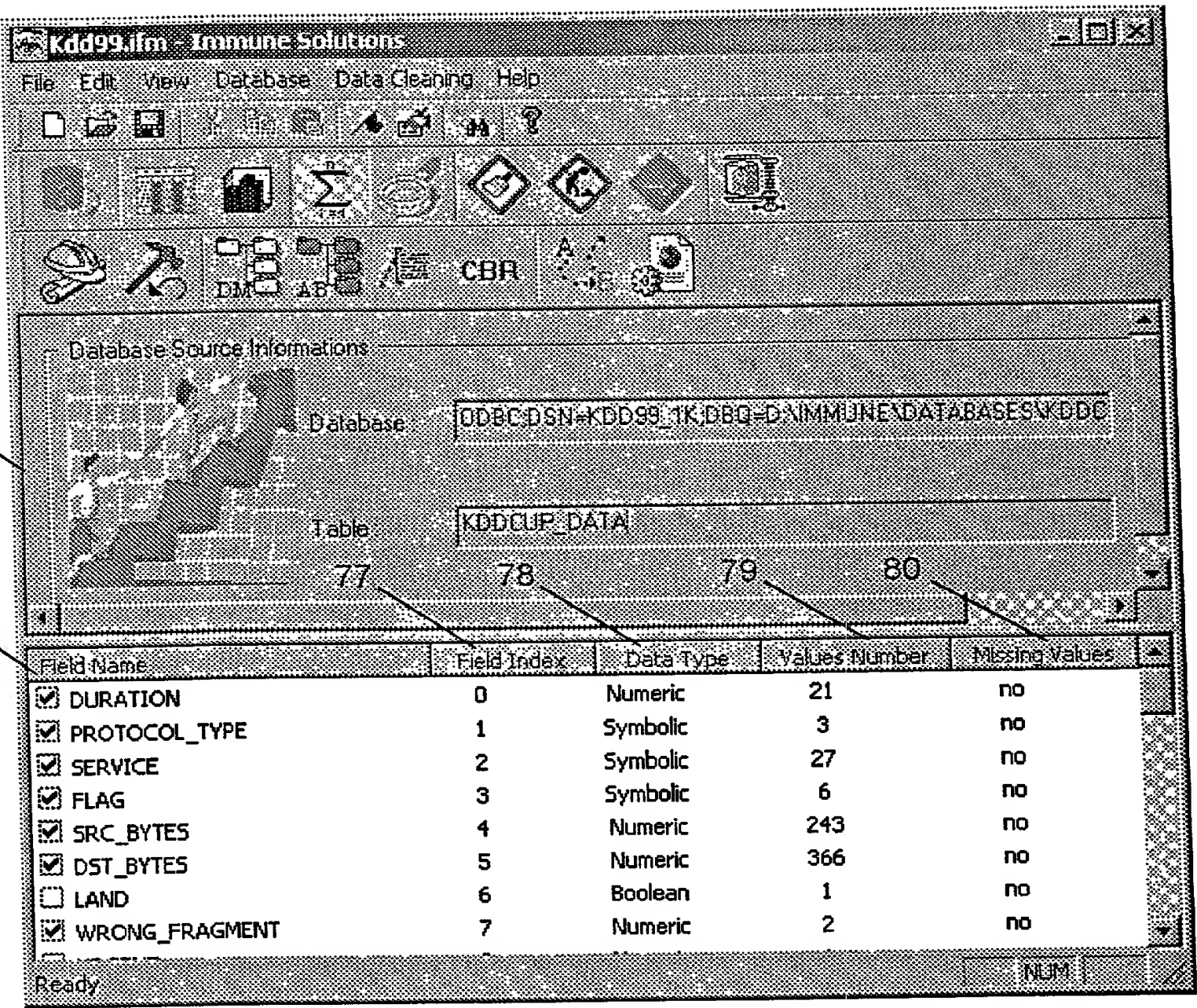


FIG. 8

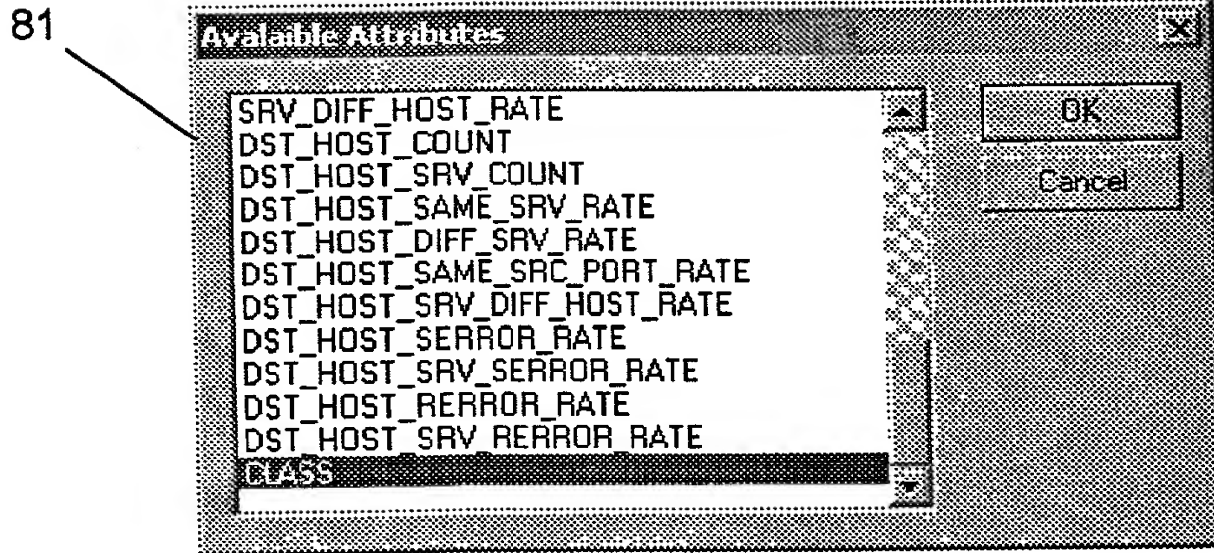


FIG. 9

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DYNAMIC DETECTION AND PREVENTION OF
ELECTRONIC FRAUD AND NETWORK
INTRUSION

12/35

82

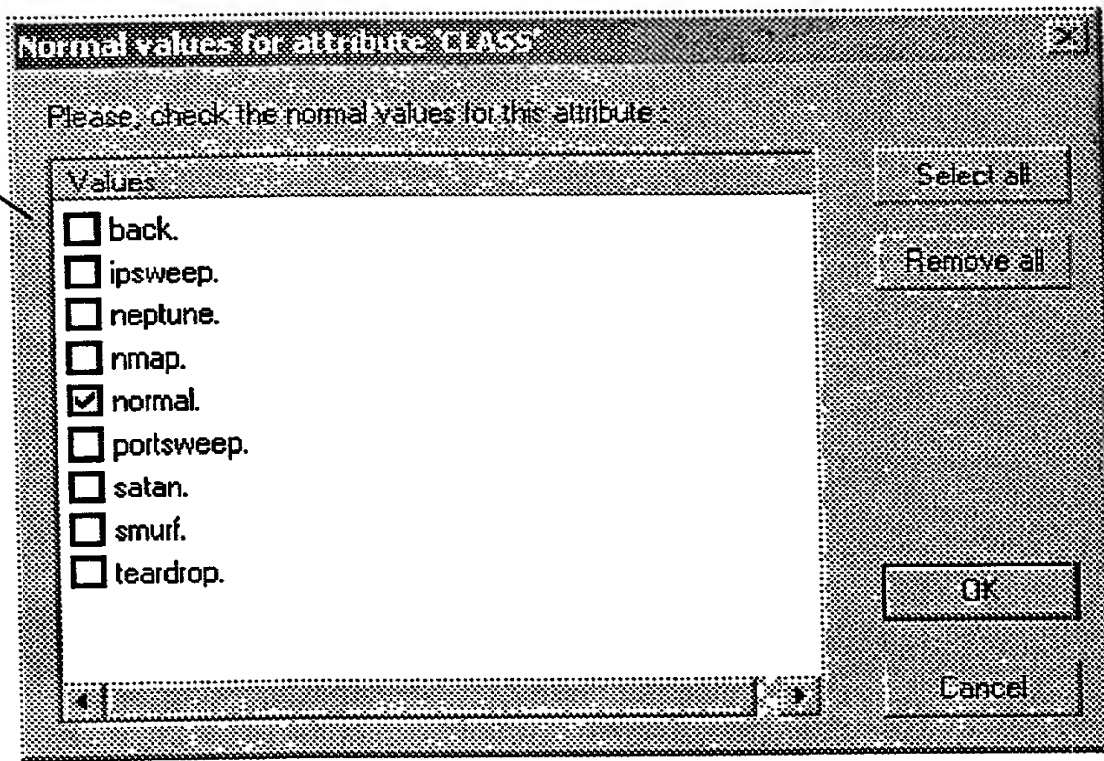


FIG. 10

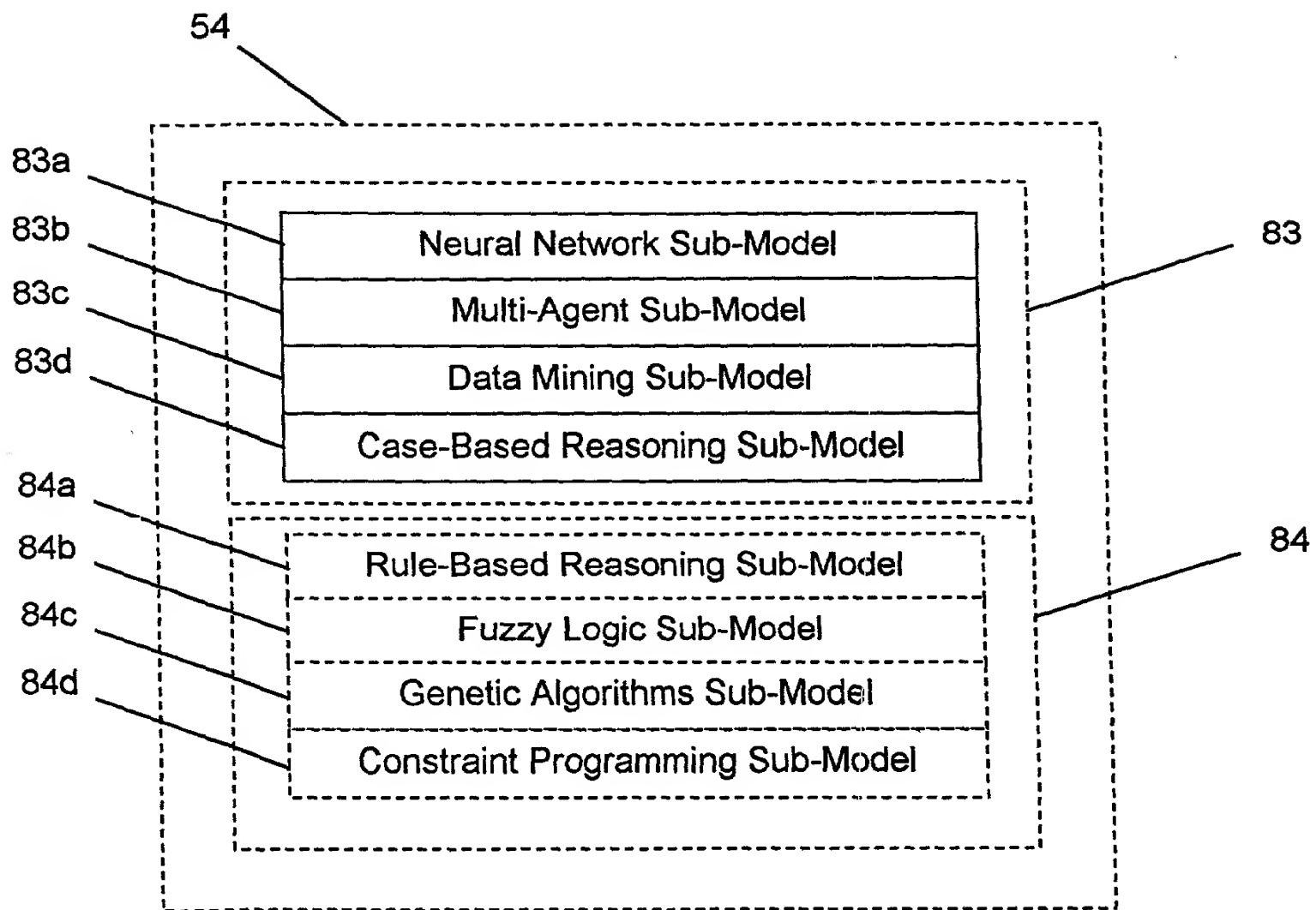


FIG. 11

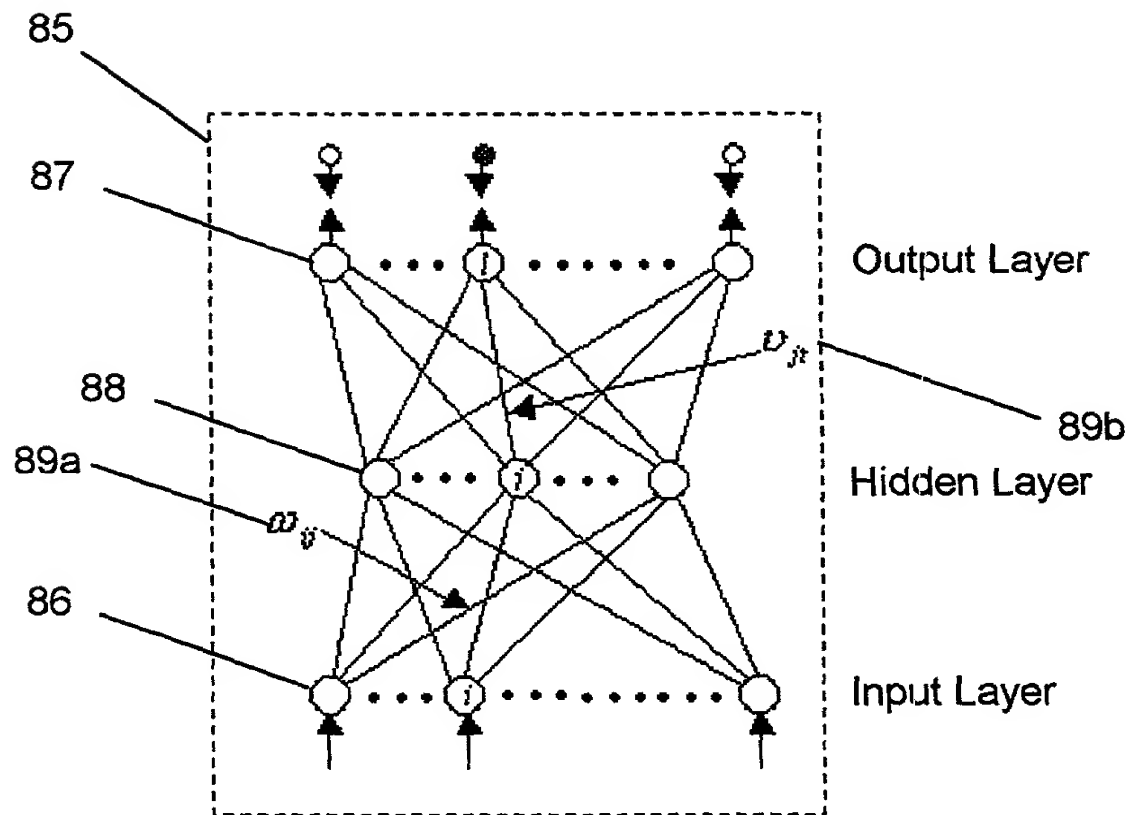


FIG. 12

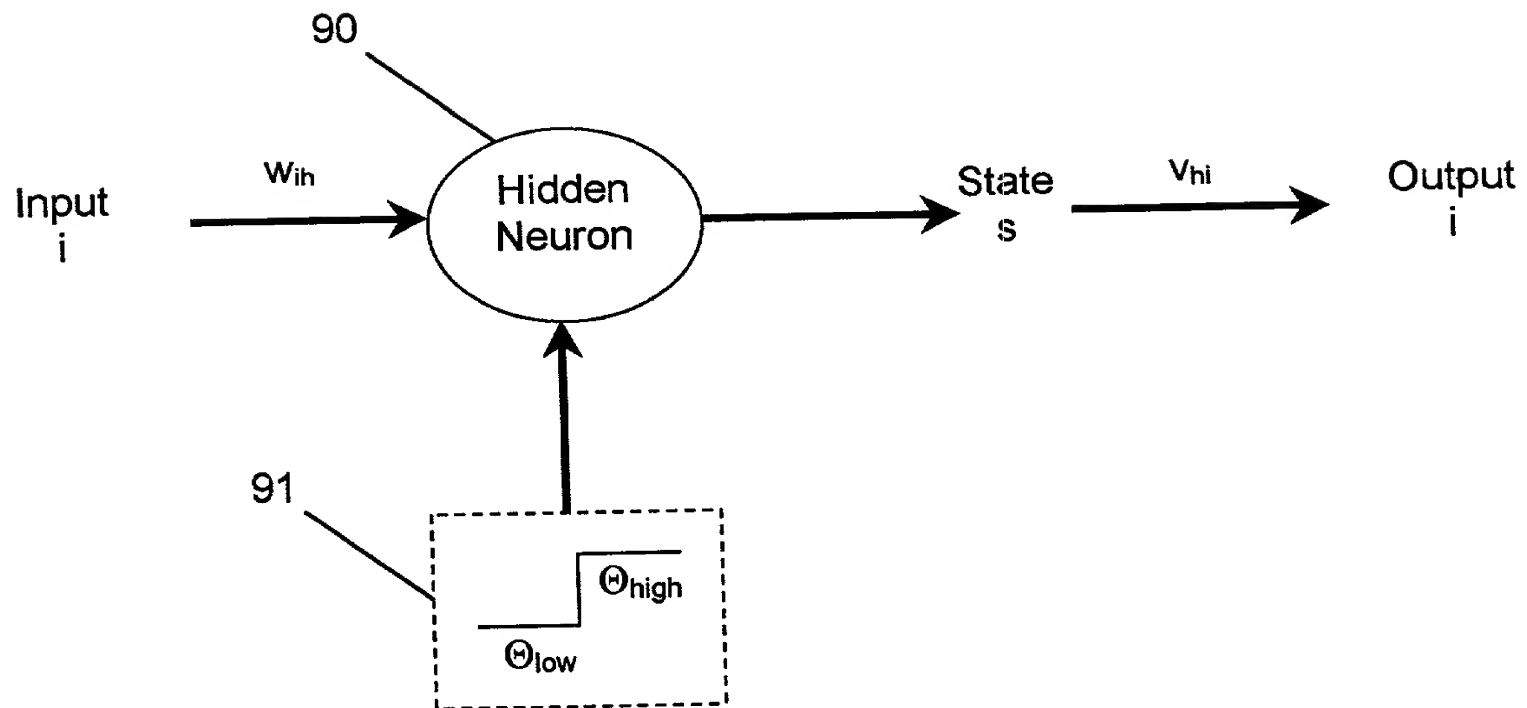


FIG. 13

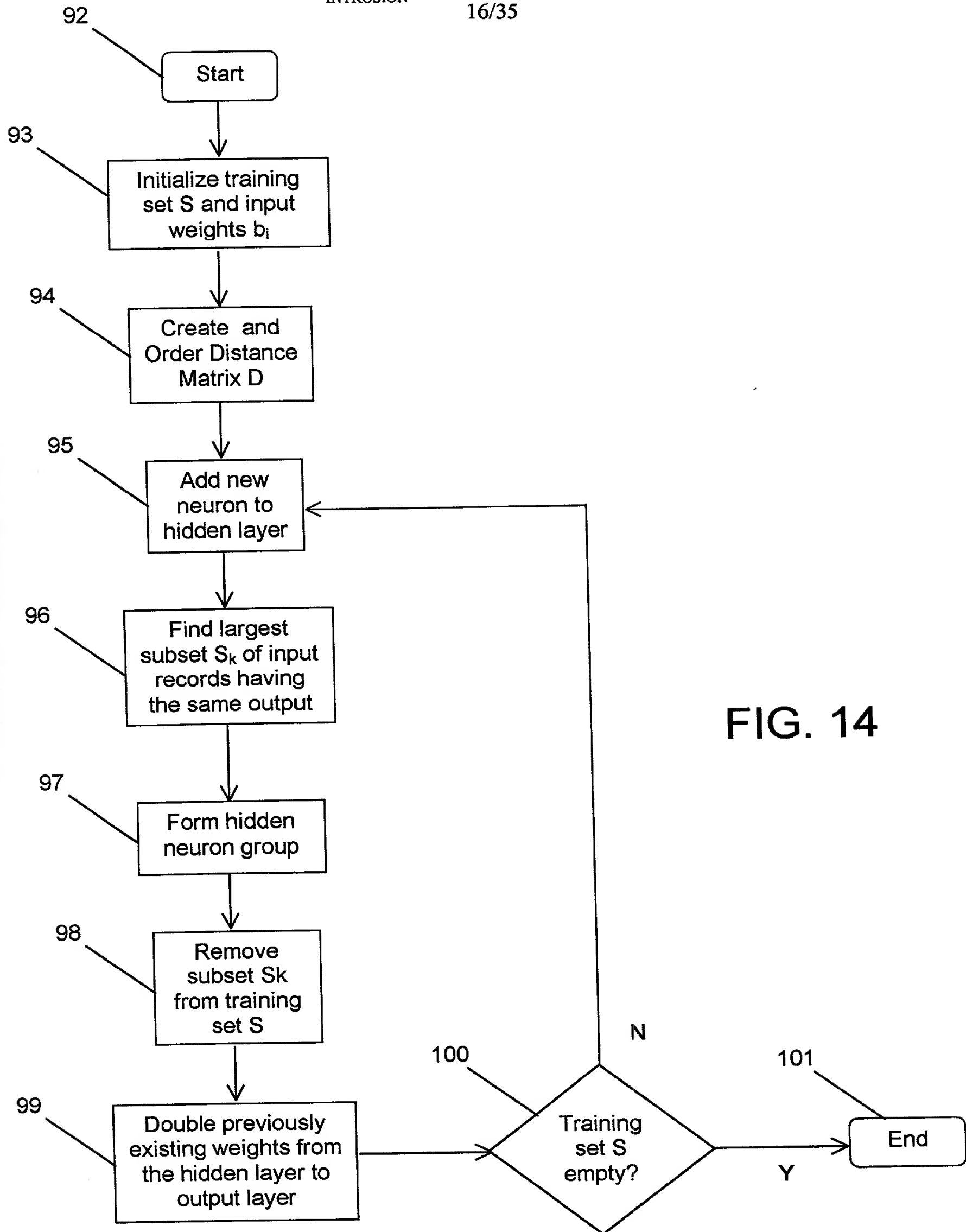


FIG. 14

102

102a	Euclidean	$d(X_i, X_j) = \sqrt{\sum_{k=1}^M (X_{i,k} - X_{j,k})^2}$
102b	Manhattan	$d(X_i, X_j) = \sum_{k=1}^M X_{i,k} - X_{j,k} $
102c	Normalized Euclidean	$d(X_i, X_j) = \sqrt{\frac{1}{M} \sum_{k=1}^M \left(\frac{X_{i,k} - X_{j,k}}{\max_k - \min_k} \right)^2}$
102d	Normalized Manhattan	$d(X_i, X_j) = \frac{1}{M} \sum_{k=1}^M \left \frac{X_{i,k} - X_{j,k}}{\max_k - \min_k} \right $
102e	Weighted-Euclidean	$d(X_i, X_j) = \sqrt{\sum_{k=1}^M b_i * (X_{i,k} - X_{j,k})^2}$

FIG. 15

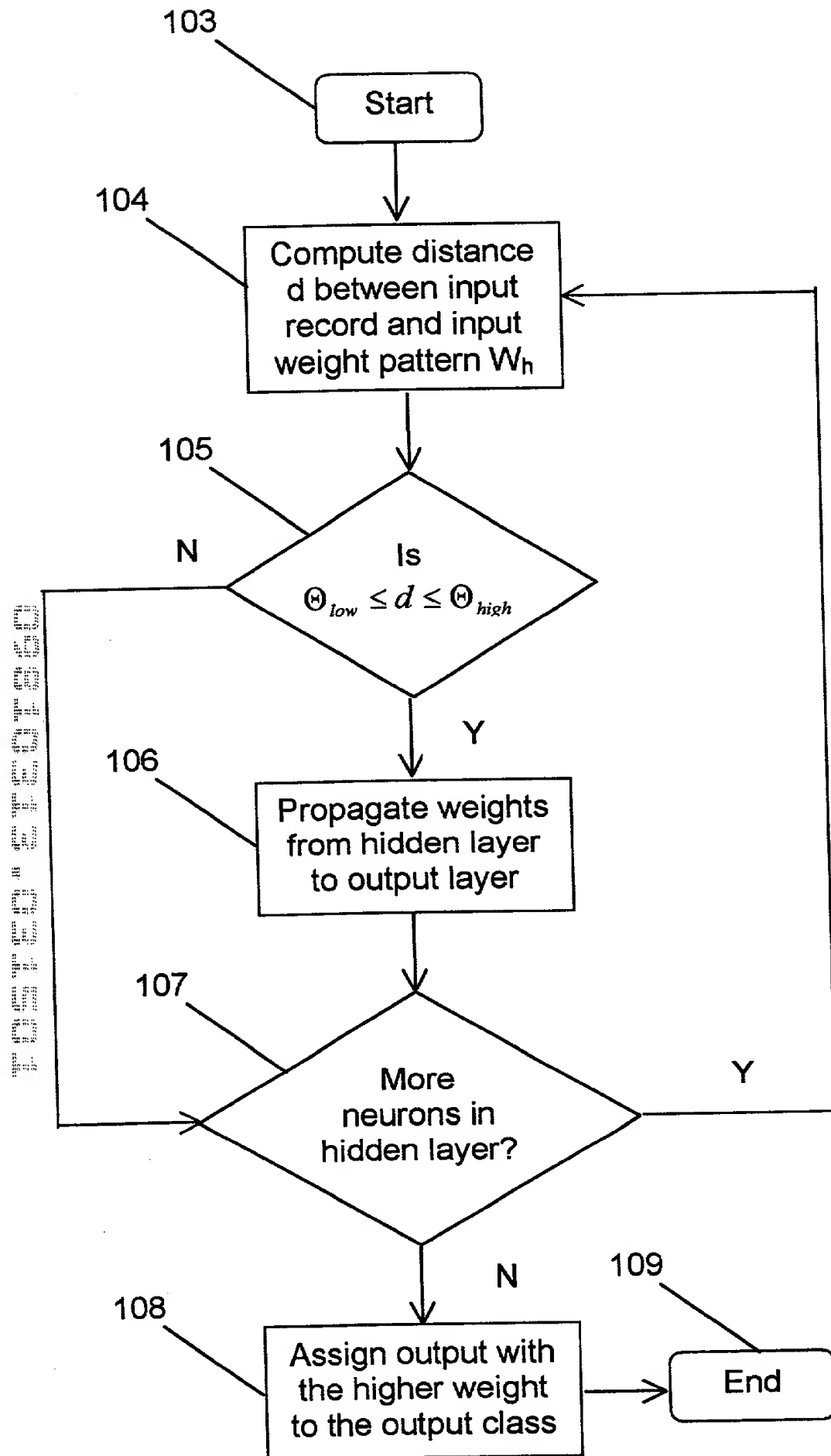


FIG. 16

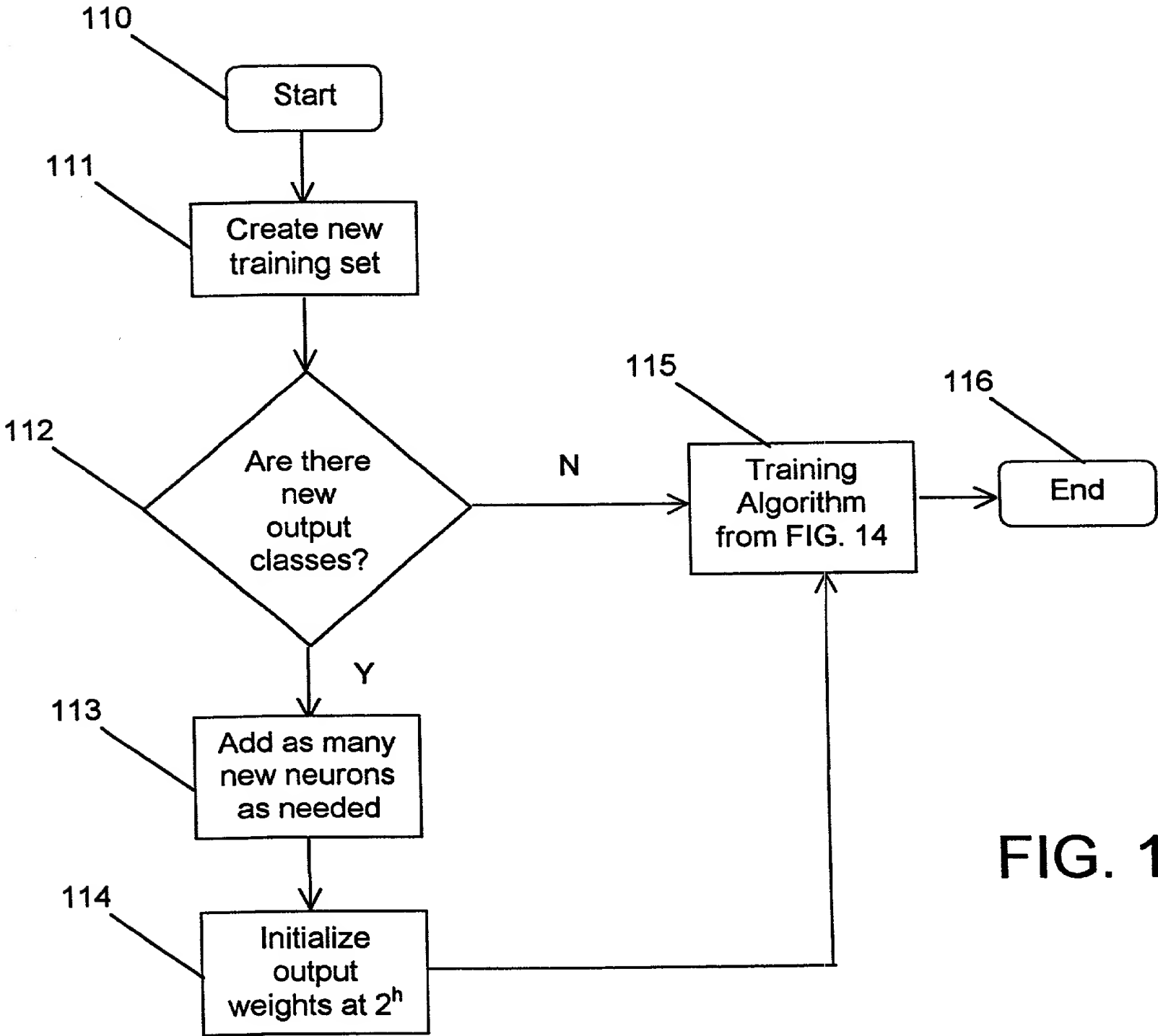
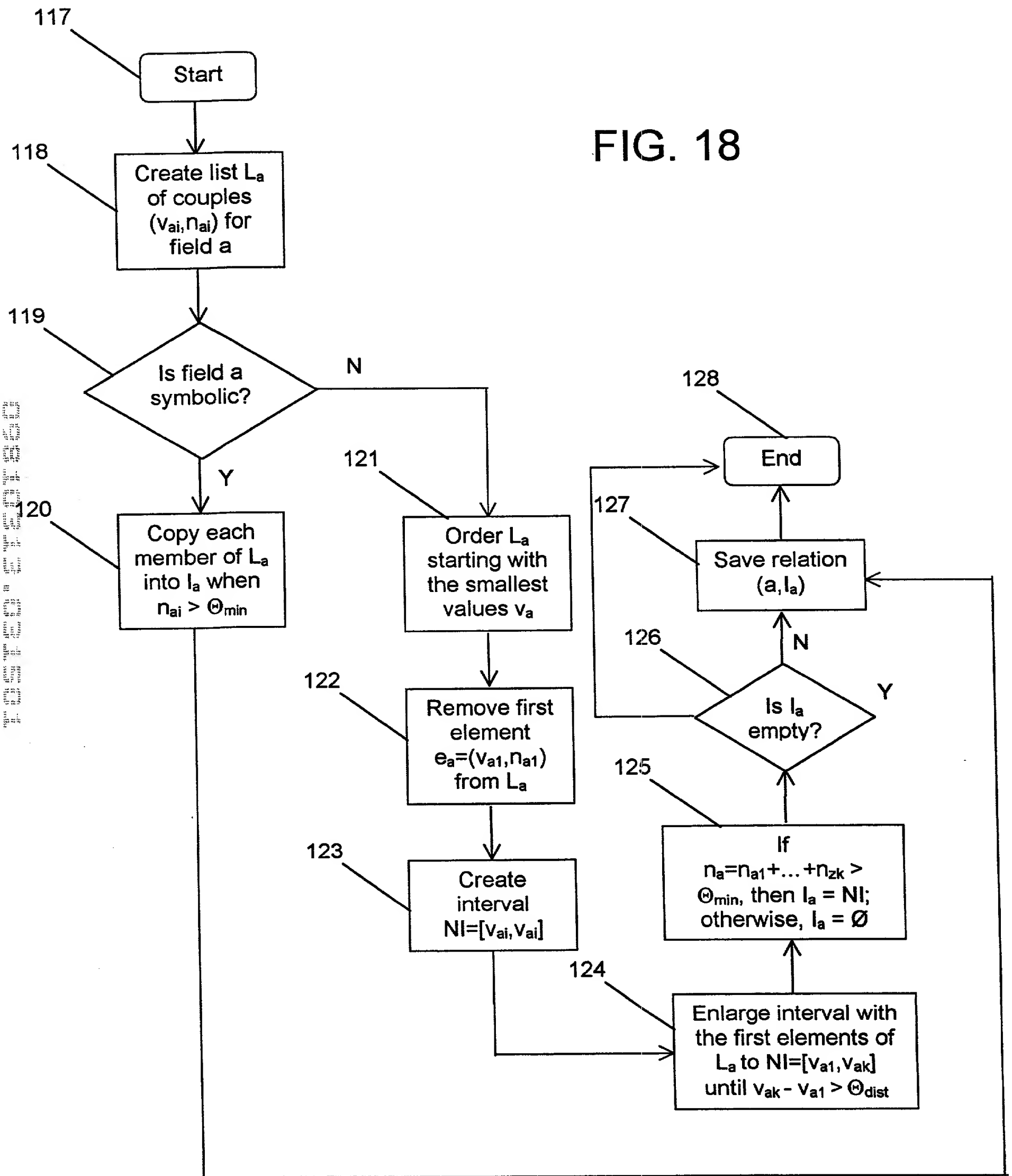


FIG. 17

FIG. 18



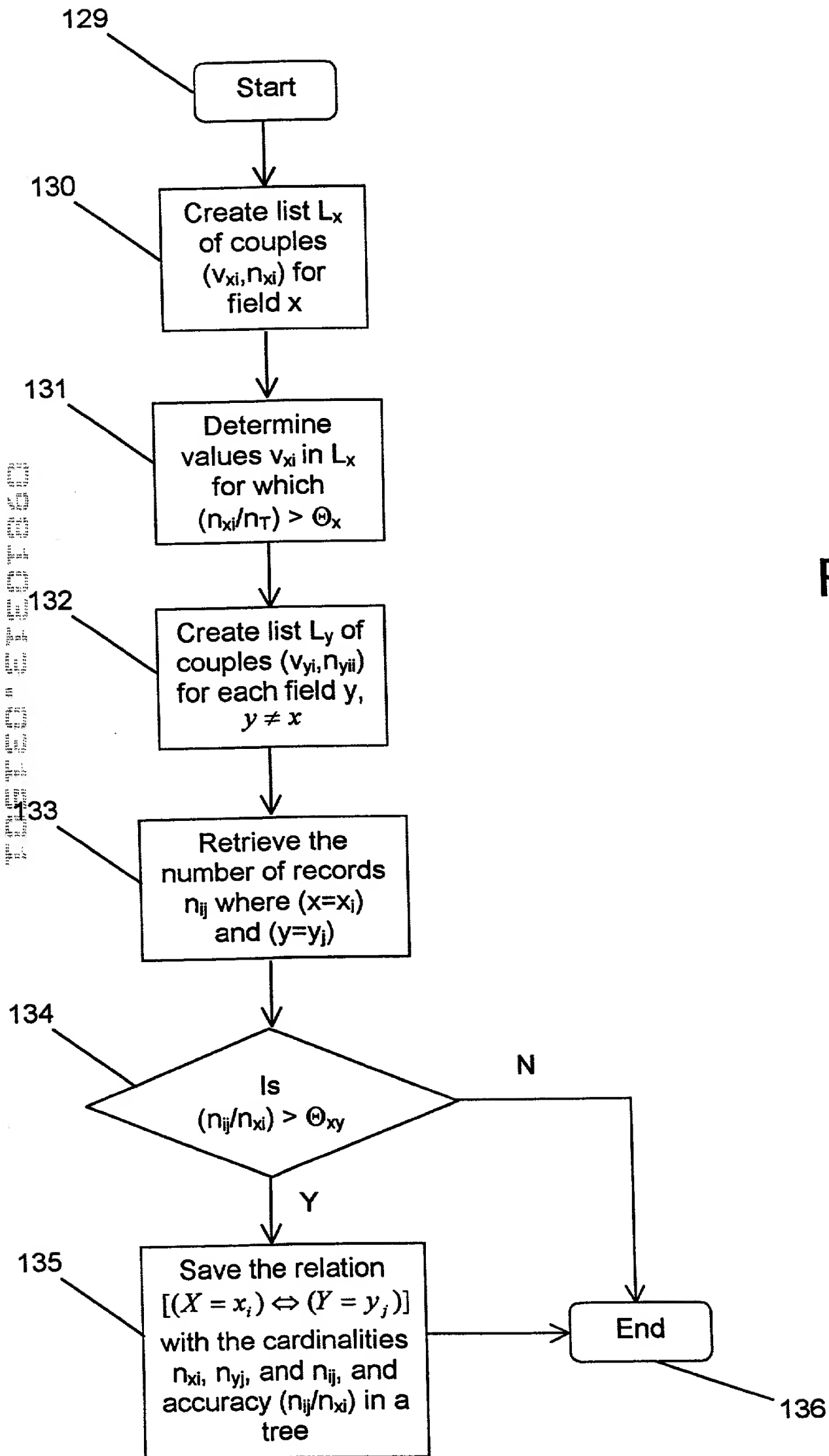


FIG. 19

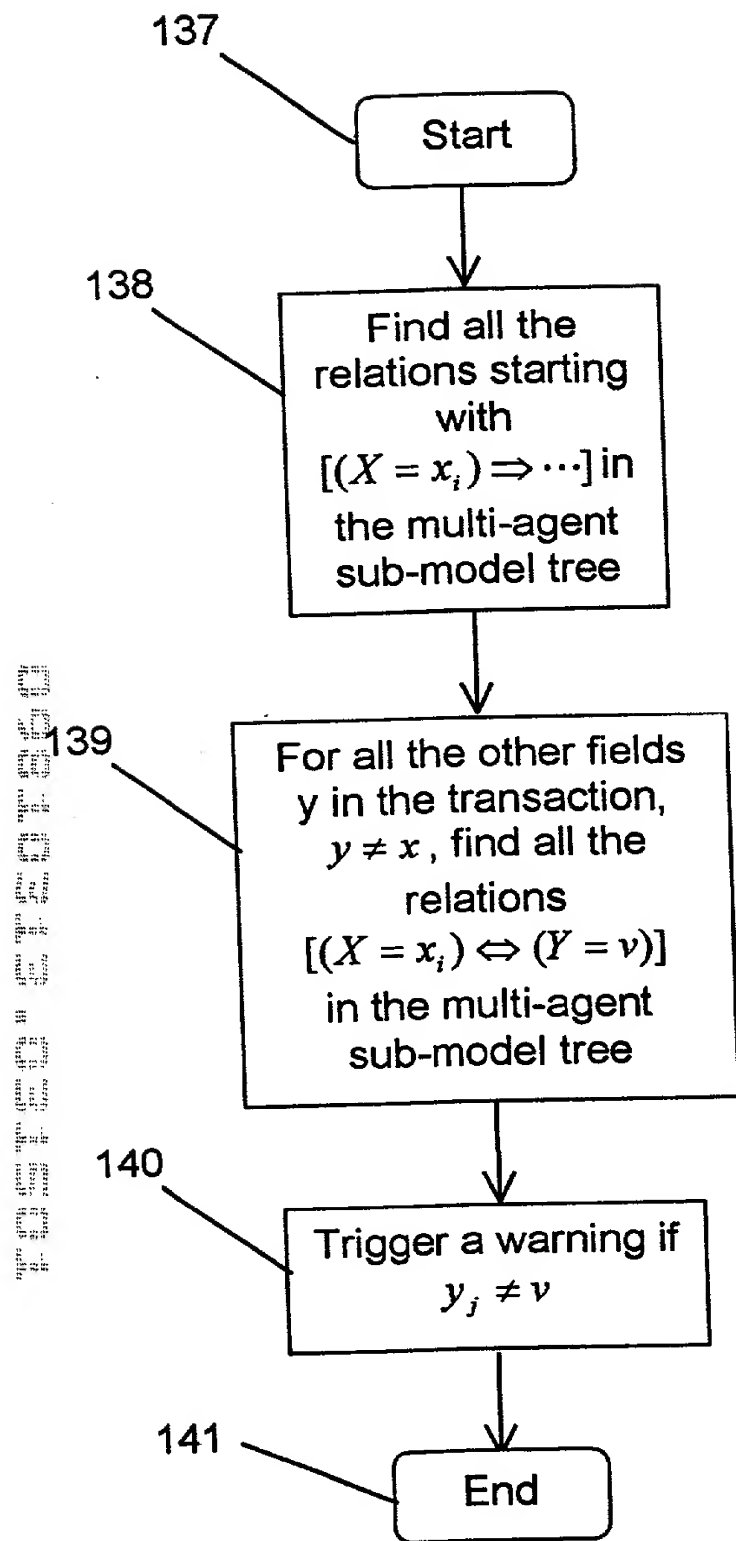
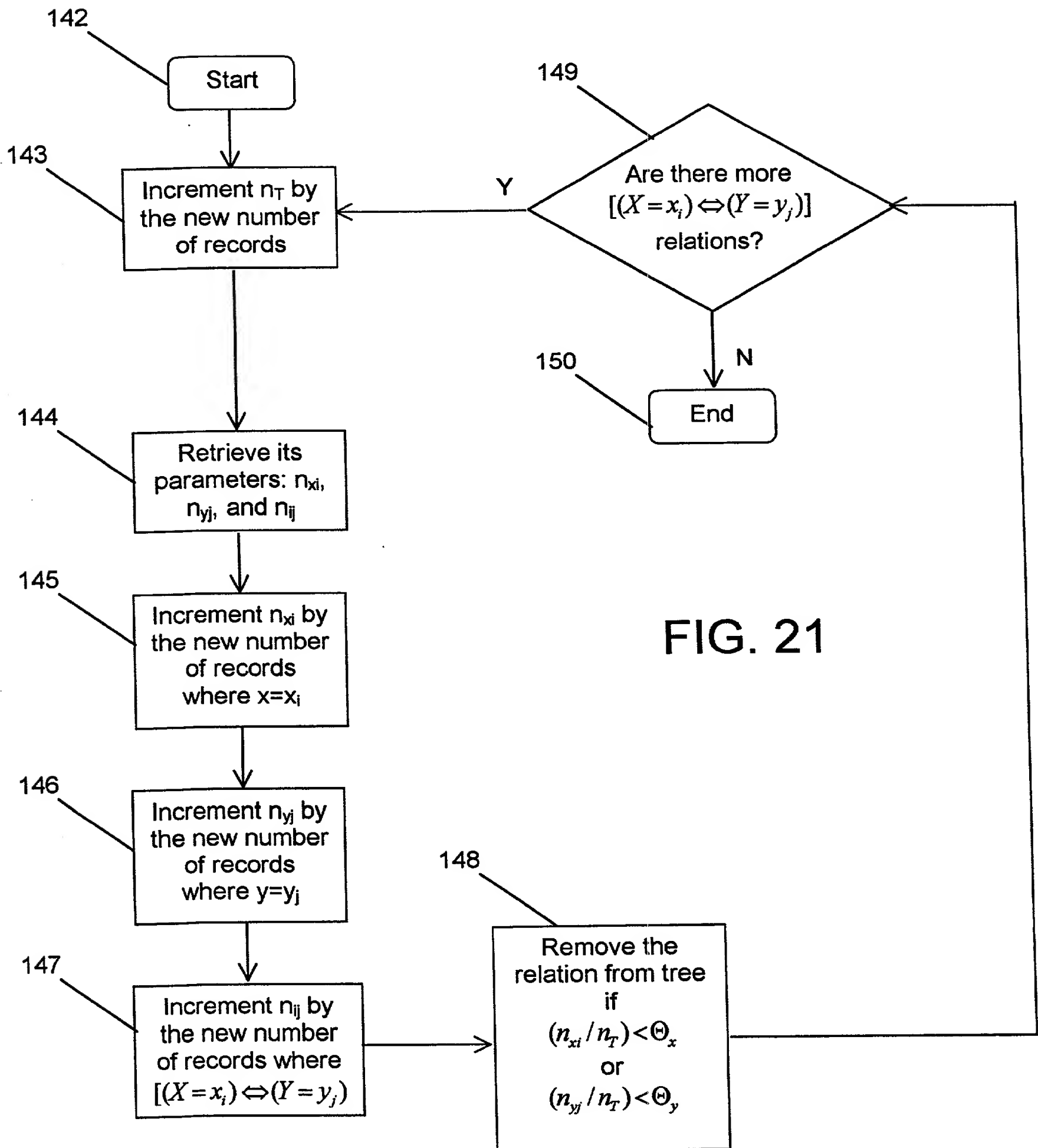


FIG. 20



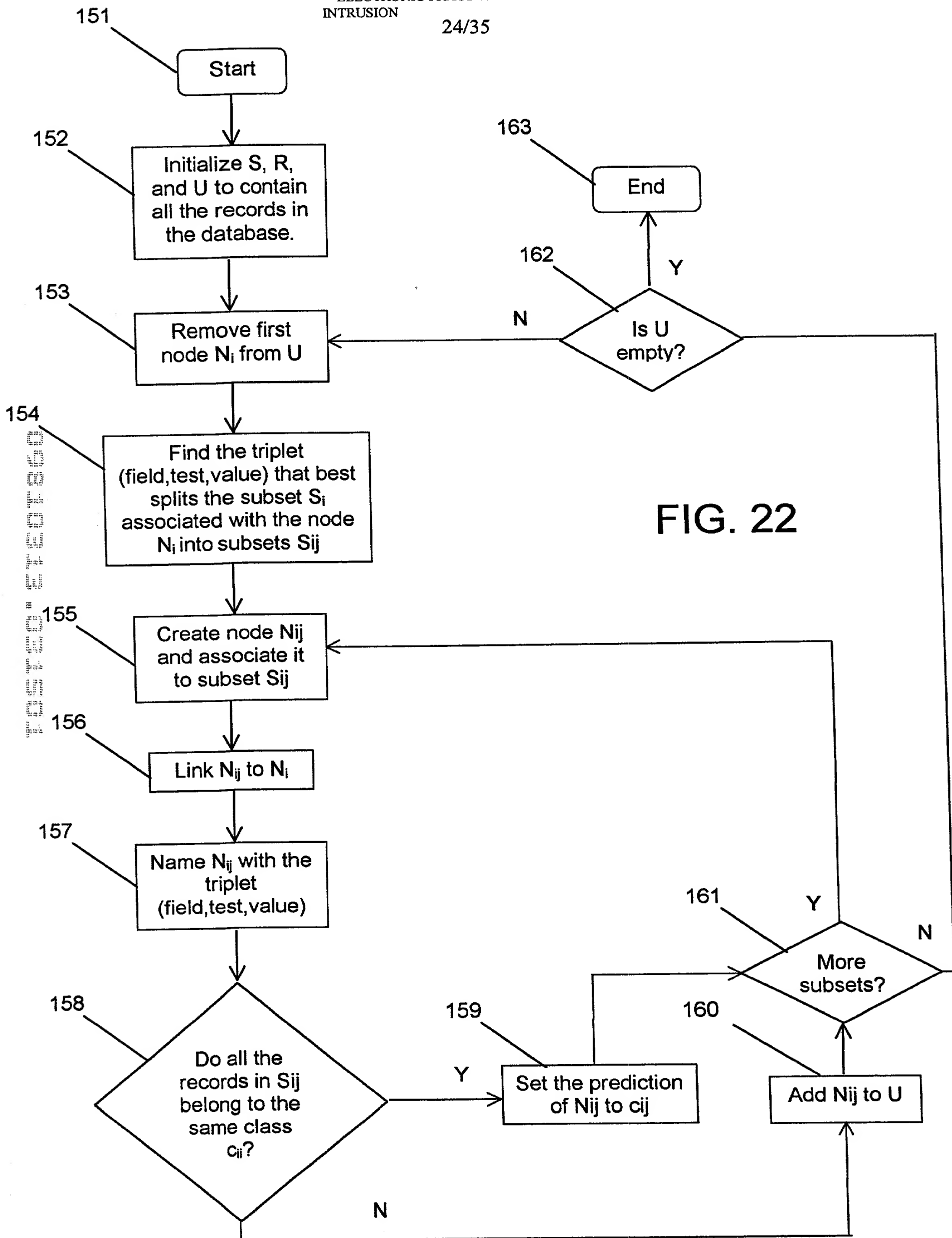
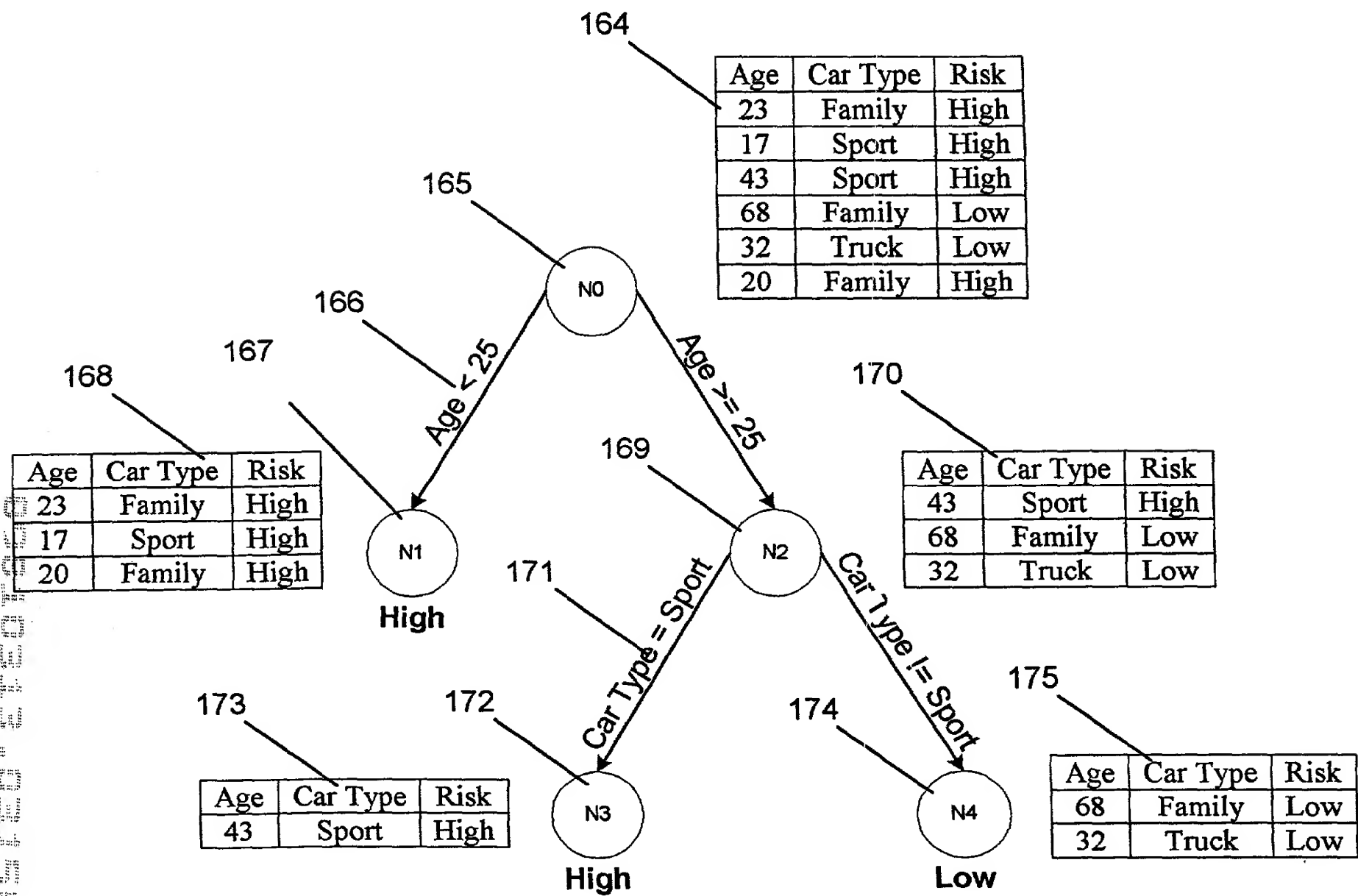


FIG. 22



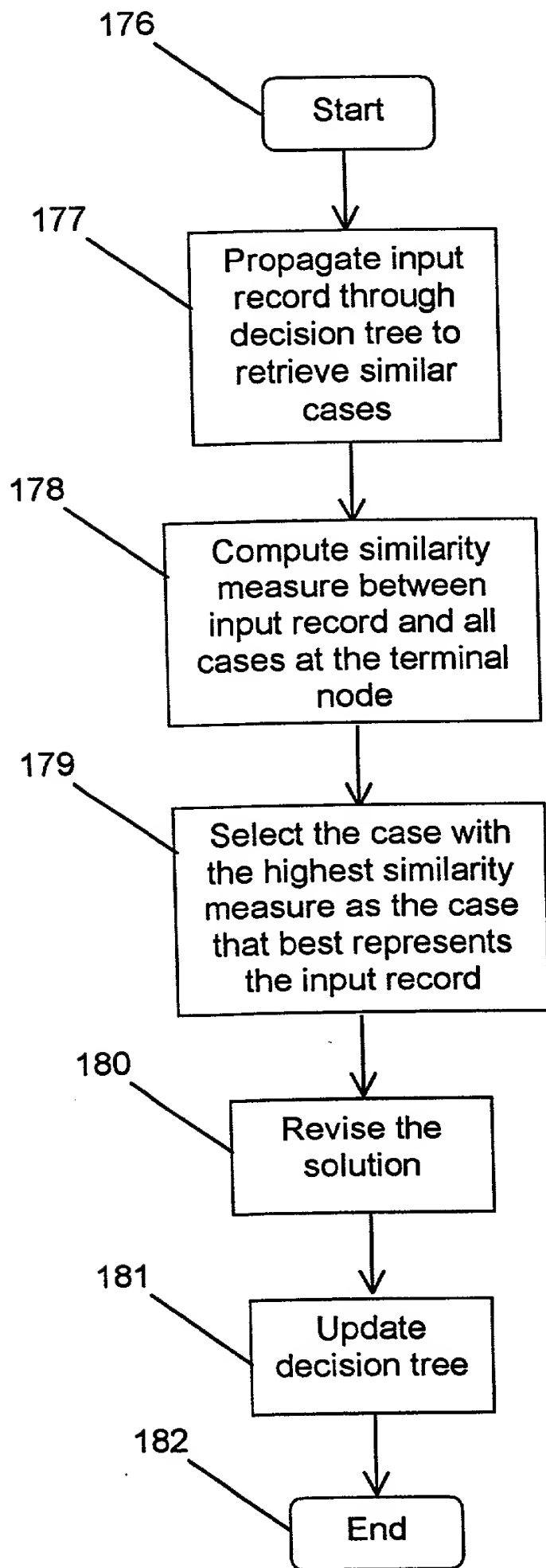


FIG. 24

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DYNAMIC DETECTION AND PREVENTION OF
ELECTRONIC FRAUD AND NETWORK
INTRUSION

183

Global Similarity Measure	Expression
City-block	$\frac{1}{p} \sum_{i=4}^p sim_i(V_{1i}, V_{2i})$
Weighted city-block	$\frac{1}{p} \sum_{i=4}^p w_i * sim_i(V_{1i}, V_{2i})$
Euclidean	$\frac{1}{p} \sqrt{\sum_{i=4}^p sim_i(V_{1i}, V_{2i})^2}$
Minkowski	$\frac{1}{p} \sqrt[r]{\sum_{i=1}^p sim_i(V_{1i}, V_{2i})^r}$
Weighted Minkowski	$\sqrt[r]{\sum_{i=1}^p w_i * sim_i(V_{1i}, V_{2i})^r}$
Weighted maximum	$\max_i w_i * sim_i(V_{1i}, V_{2i})$

FIG. 25

Local Similarity Measures	Field Type	Field Valuation
$\begin{cases} 0, if V_1 \cap V_2 = \emptyset \\ 1, otherwise \end{cases}$	Nominal	Single, multiple
$\frac{Card(V_1 \cup V_2) - Card(V_1 \cap V_2)}{Card(V_1 \cup V_2)}$	Nominal	Multiple
$\frac{Card(V_1 \cup V_2) - Card(V_1 \cap V_2)}{Min(V_1 \cup V_2)}$	Nominal	Multiple
$\frac{Card(V_1 \cup V_2) - Card(V_1 \cap V_2)}{Max(V_1 \cup V_2)}$	Nominal	Multiple
$\frac{Card(V_1 \cup V_2) - Card(V_1 \cap V_2)}{Card(O)}$	Nominal	Multiple
$\frac{ec(\min(V_1^-, V_2^-), \max(V_1^+, V_2^+)) - Card(V_1 \cap V_2)}{Card(O)}$	Ordinal, Numeric	Multiple
$\frac{ V_1 - V_2 }{ec(O)}$	Numeric	Single
$\frac{ V_{1c} - V_{2c} }{ec(O)}$	Numeric	Multiple
$\frac{ec(\min(V_1^-, V_2^-), \max(V_1^+, V_2^+)) - ec(V_1 \cap V_2)}{ec(O)}$	Numeric	Multiple
$\frac{ec(V_1 \cup V_2) - ec(V_1 \cap V_2)}{ec(V_1 \cup V_2)}$	Numeric	Multiple
$\frac{ec(V_1 \cup V_2) - ec(V_1 \cap V_2)}{\min(ecV_1, ecV_2)}$	Numeric	Multiple
$\frac{ec(V_1 \cup V_2) - ec(V_1 \cap V_2)}{\max(ecV_1, ecV_2)}$	Numeric	Multiple
$\frac{2 * h(V_1 \cup V_2) - h(V_1) - h(V_2)}{2 * h_{max}}$	Taxonomic	Multiple
$\frac{h(\text{node that unit } V_1 \text{ \& } V_2)}{\text{total height of } h}$	Taxonomic	Single

FIG. 26

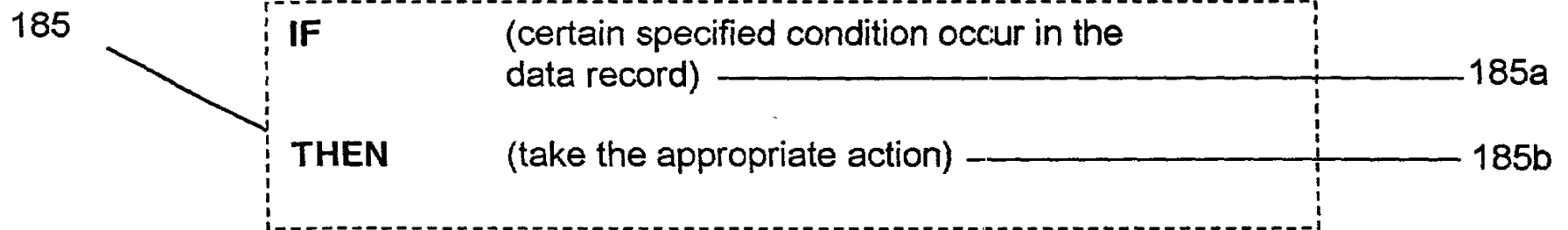


FIG. 27

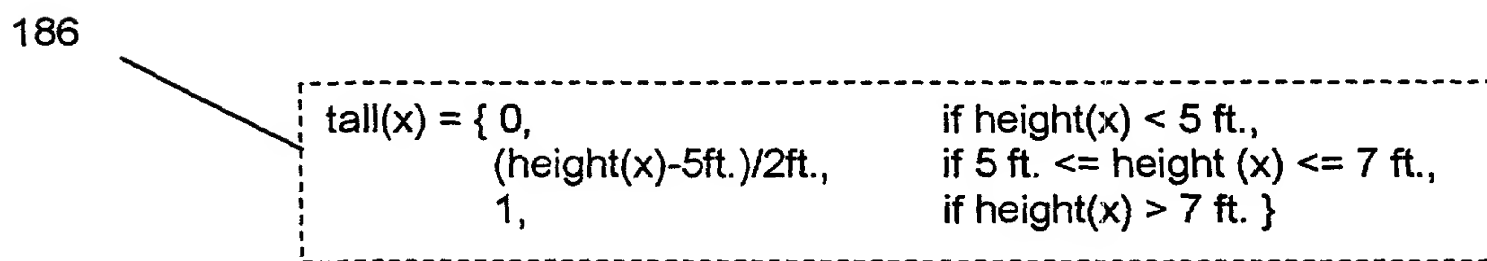
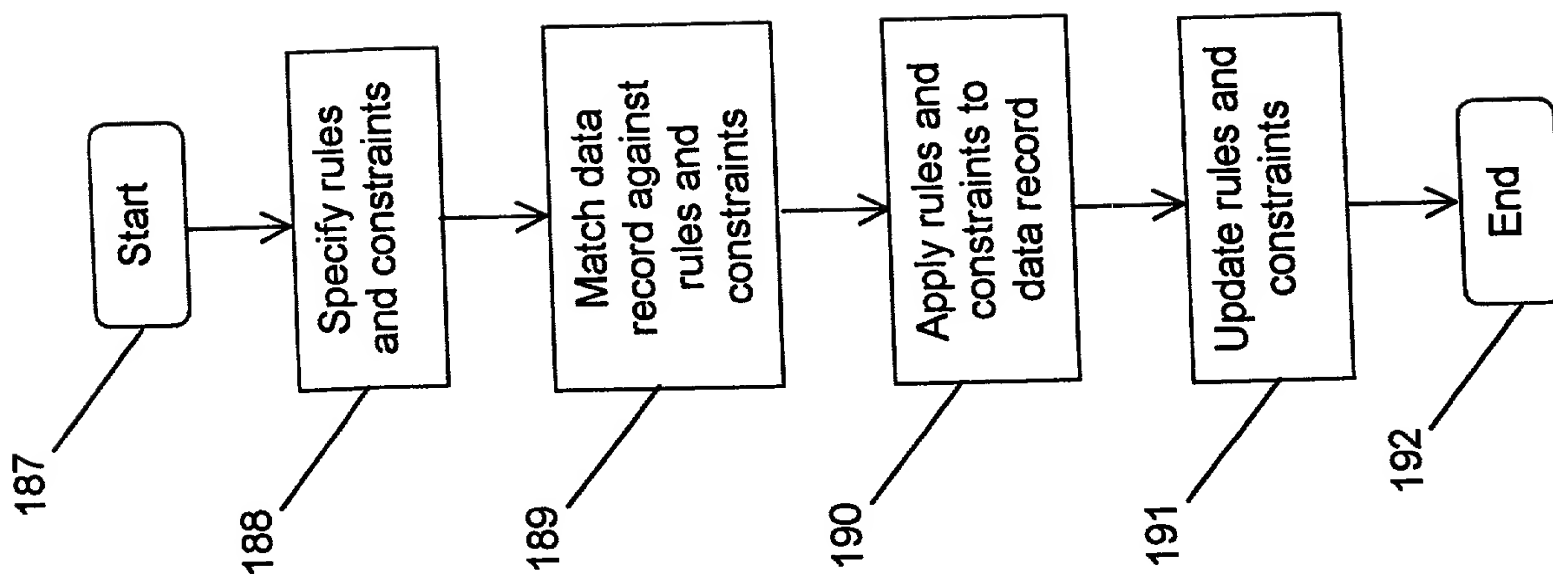


FIG. 28

FIG. 29

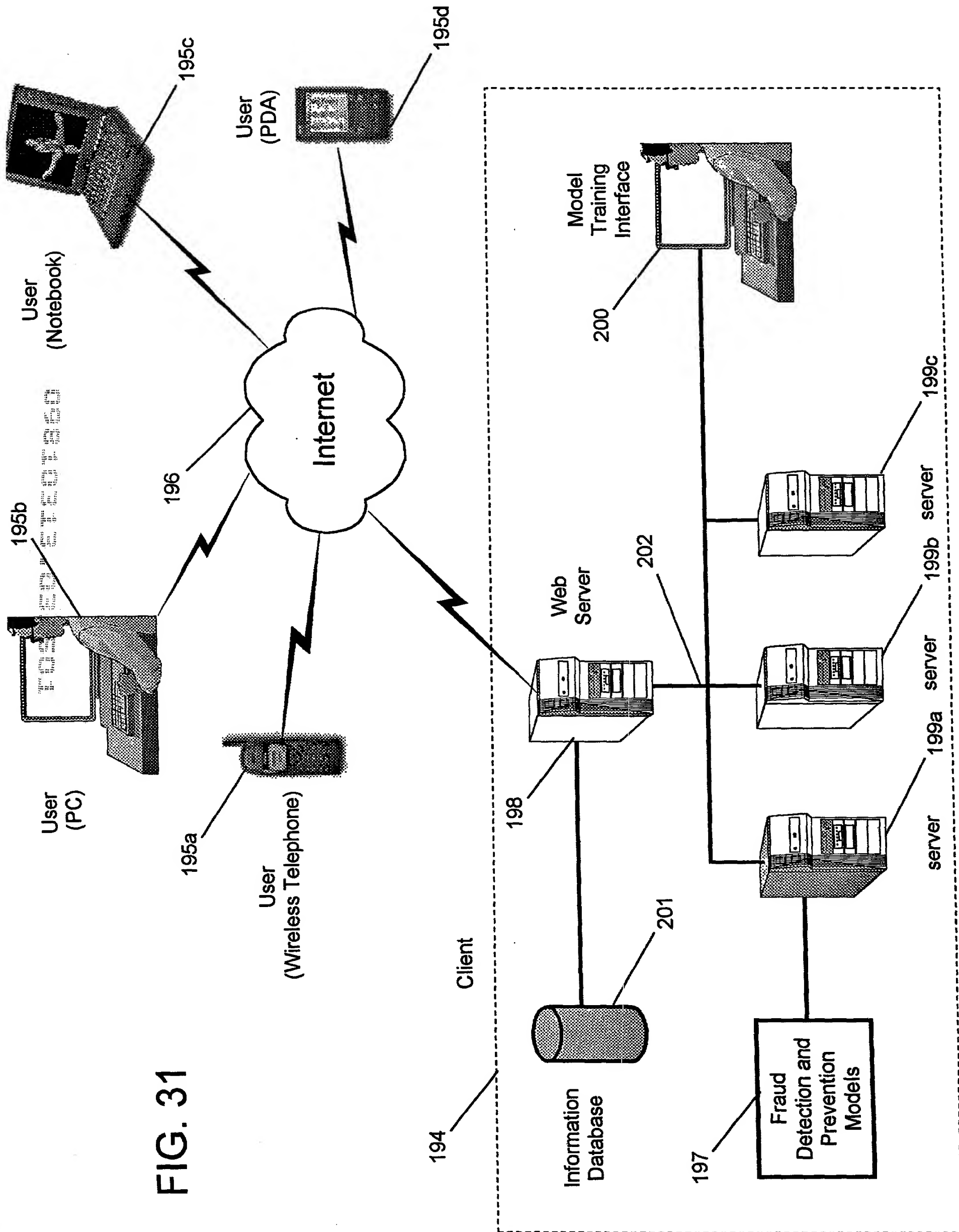


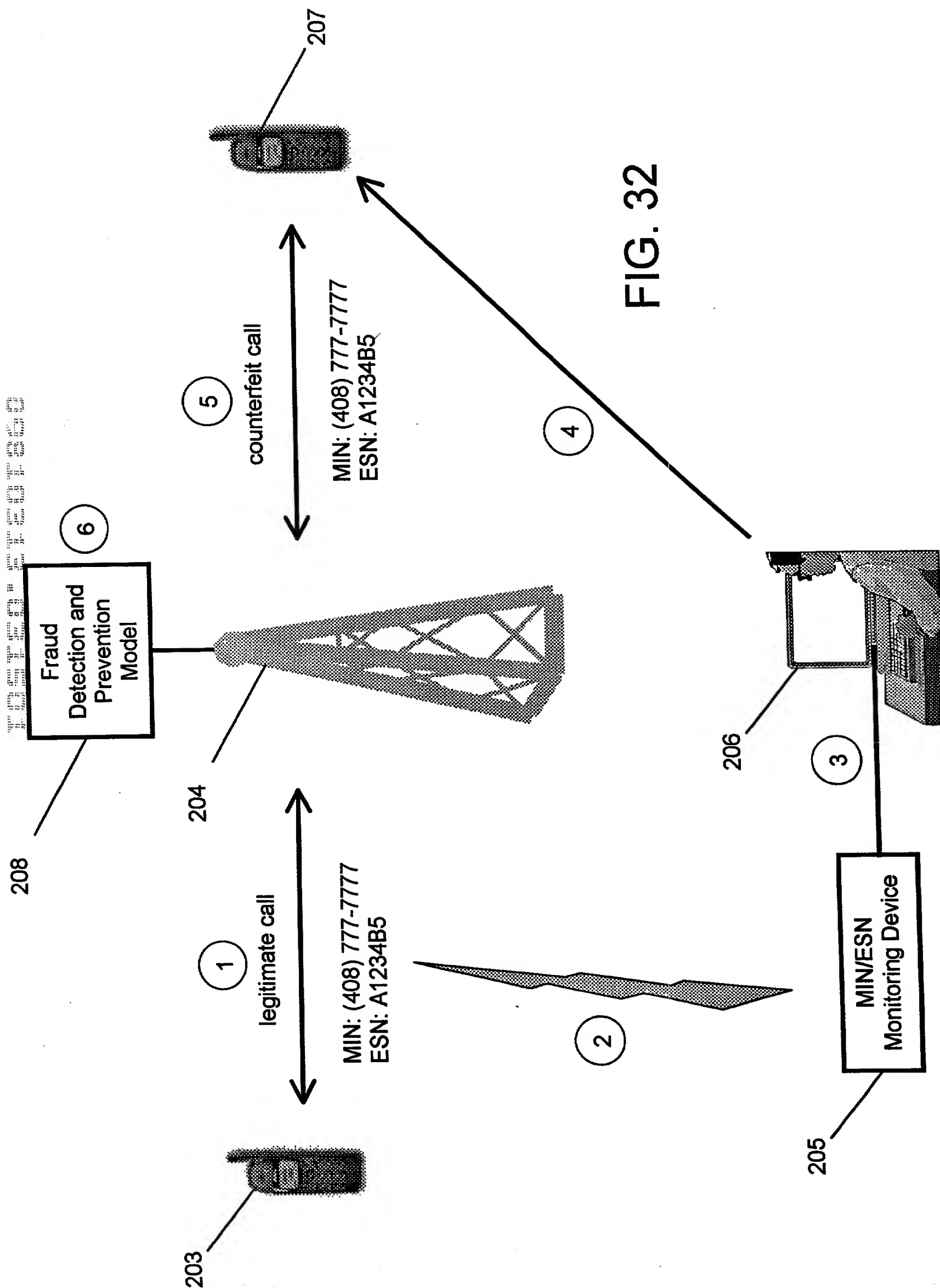
For : SYSTEMS AND METHODS FOR
DYNAMIC DETECTION AND PREVENTION OF
ELECTRONIC FRAUD AND NETWORK
INTRUSION



FIG. 30

FIG. 31





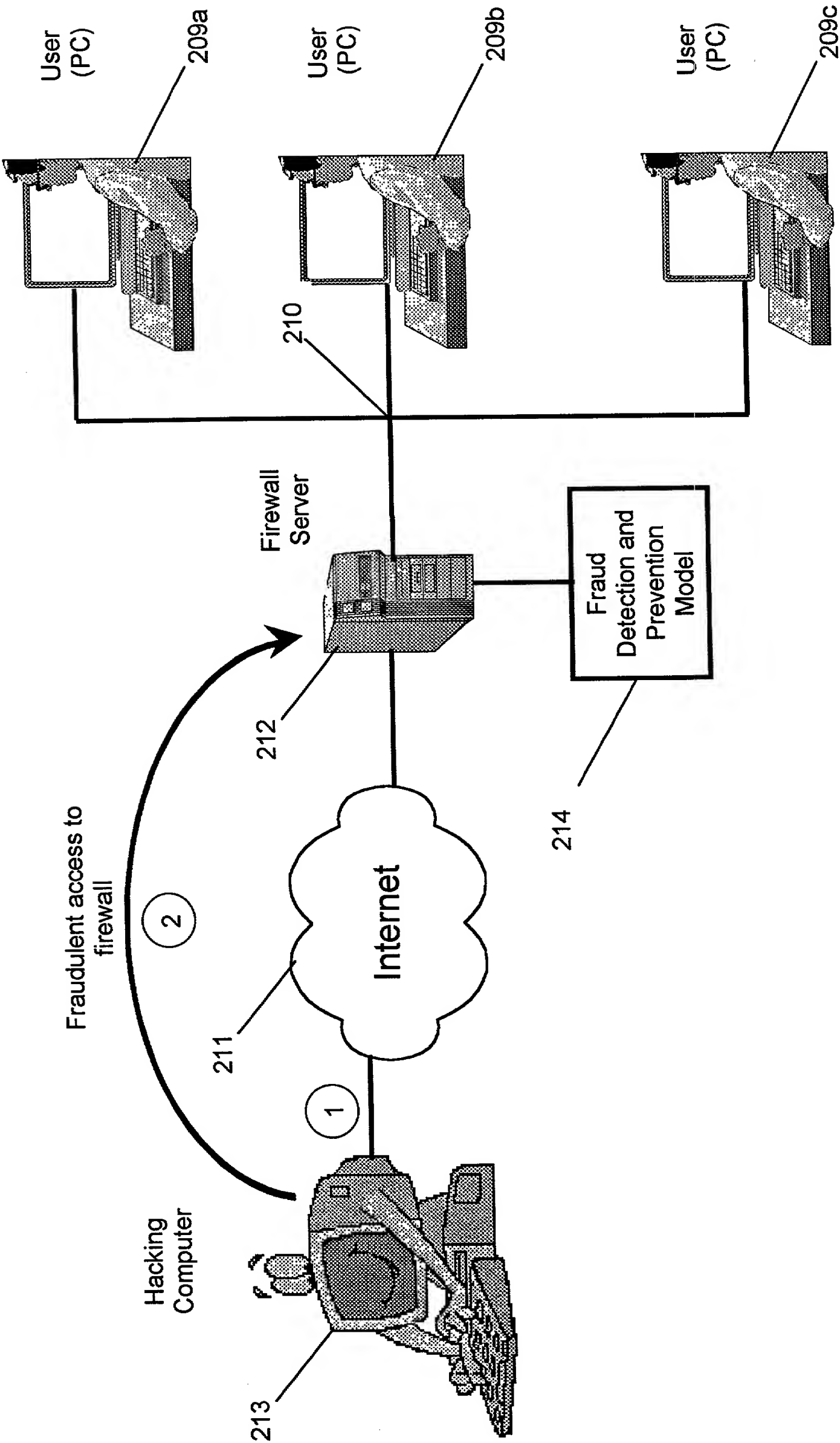


FIG. 33

FIG. 34

